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ABSTRACT

This review of the literature on self-speech, a subset of a communicative speech (speech not intended for nor effectively adapted for communication with others), focuses on the concept of self-control through language. The theories of six major researchers in the area of self-speech--J. Piaget, L. Vygotsky, A. Luria, H. Reese, J. Flavell, and L. Kohlberg--are discussed in the next section in the chronological order in which they were developed and presented in the literature. The paper concludes with a brief overview of the development of cognitive behavior modification and cognitive training principles that have been influenced by the self-regulating aspects of self-speech. (AEA)

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Self-Speech, Language, and Cognitive Training: A Review of Theory and Practice

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I. Introduction

The term self-speech is frequently either used synonymously or confused with the terms egocentric speech, private speech, and inner speech. Thus, further definition is needed. Self-speech is a subset of acommunicative speech. Acommunicative speech is defined as all speech phenomena that are "not intended for, or not effectively adapted for, communication with others" (Zivin, 1979, p. 9). Acommunicative speech may or may not be self-regulating, may be overt or covert, and can occur either voluntarily or involuntarily. The term self-speech, as used in this study, refers to that subset of acommunicative speech which is self-regulating. Harris (1979, p. 51) defines such verbal regulation as "the process through which some component of the language system monitors, controls, organizes, structures, or plans behavior arising in some nonverbal system in the individual." This self-control through language may be either overt or covert, and may operate on motor activity, cognitive processing, or perceptual processing.

Theories of Self-Speech

Piaget (1923/1955) has described egocentric speech as presocial and noncommunicative speech carried on alone or in the presence of others. He did not assign or explore cognitive functions to this acommunicative speech. Rather, Piaget divided egocentric speech into three basically nonproductive categories: repetition, the monologue, and the collective monologue. To Piaget, this type of acommunicative speech reflected the "egocentric" state of the child, and declined monotonically with age as socialized speech developed.

Theories advanced by Flavell, Kohlberg, Luria, and Reese, and Vygotsky (cf. Zivin, 1979) take a different perspective. While differences exist in their individual theories, all agree that self-speech serves definite cognitive functions (although some theorists, such as Kohlberg, do not deny that some self-speech indicates social development). Self-speech reflects increased cognitive functioning, which the child at first deals with in an outloud, or overt fashion. Slowly, the child makes the transition from outer speech to thought. Luria (1961) describes the developmental course of self-speech as beginning with the child's responses to the speech of others, followed by the child's use of overt self-direction, and finally covert thought or inner speech.

Vygotsky (1962, p. 133) views self-speech as being "intimately and usefully connected with the child's thinking." To Vygotsky, self-speech serves the cognitive functions of orienting, organizing, and structuring behavior. It may help the child to consciously understand a problem or situation and to overcome difficulties. Consequently, Vygotsky believed that self-speech would increase in task situations of increasing difficulty. He further postulated that as overt self-speech makes the gradual transition to inner speech and thought, it becomes increasingly inaudible, condensed, and incomprehensible. Thus, self-speech progressively becomes more like thought in both structure and function. Additionally, he proposed a curvilinear developmental pattern, showing self-speech increasing with age until internalization begins. Vygotsky reports that self-speech increases until the age of 6 or 7, declining and virtually disappearing by age 8-10. However, self-speech can occur overtly at any age, whenever the individual encounters obstacles or problems. Thus, individuals at any age may resort to "thinking outloud" when faced with a difficult problem or situation. The individual theories and supportive research offered by Flavell, Kohlberg, Luria, Piaget, Reese, and Vygotsky will be presented in Section II.

Self-Speech and Cognitive Training

The development of cognitive training techniques by Meichenbaum (1976, 1977) and others has been strongly influenced by Luria (1961) and Vygotsky's (1962) theories of the relationships between self-speech, thought, and behavior (Abikoff, 1979; Zivin, 1979). Today, both behaviorists and cognitive therapists recognize the roles that cognitions, including self-speech, can play in determining and regulating behavior (Mahoney & Thoresen, 1974; Martin & Pear, 1978). Meichenbaum (1976) has suggested that learning problems may be due, in large part, to the child's use of nonfunctional or poorly organized cognitions (self-speech, thoughts, images, perceptions, and beliefs). Therefore, cognitive behavior modification (CBM) techniques have been developed which focus on the replacement of nonfunctional, inappropriate cognitions with effective, organized, task relevant cognitions. CBM techniques can be applied to a variety of areas, including social, emotional, and cognitive problems. Treatment approaches which attempt to teach the student to produce and apply cognitive strategies in task situations are one application of cognitive behavior modification principles (K. Harris, 1980).

CBM has several typical components (Abikoff, 1979; Meichenbaum & Goodman, 1971). Students learn to control their own behavior through processes such as self-instruction, self-monitoring, and self-reinforcement. Verbalization, often overt at first and later covert, is used to guide the student through a series of task-analytic steps aimed at producing effective behavior. Modelling is a common and effective method of teaching the learner to verbalize through these steps. Additionally, many CBM procedures incorporate teaching students to delay responding in order to evaluate various alternatives. Cognitive training strategies and cognitive behavior modification procedures will be discussed further in Section II.

II. Review of Literature

Theories of Self-Speech

The theories of the six major theorists in the area of self-speech are presented in this section. The theories are presented in the chronological order in which they were developed and presented in the literature by Piaget, Vygotsky, Luria, Reese, Flavell, and Kohlberg. This presentation of theories of self-speech is followed by a discussion of the development of cognitive behavior modification and cognitive training principles influenced by the self-regulatory attributes of self-speech.

Piaget's Egocentric Speech

While both Piaget (1923/1955) and Vygotsky (1934/1962) have used the term "egocentric speech" to refer to children's acommunicative speech, Piaget's was the first position to appear in print (Zivin, 1979). As noted earlier, Piaget used the term egocentric speech to refer to speech by the child which is not adapted to the point of view of the listener and which does not invite dialogue and exchange of ideas. He divided this acommunicative speech into three categories: repetition, the monologue, and the collective monologue. Piaget describes the monologue as "the child is impelled, even when he is alone, to speak as he acts, to accompany his movements with a play of shouts and words"

(1923/1955, p. 40). The collective monologue is described as when the child is "soliliquizing before others...but not really addressing himself to (his audience). He is not speaking to anyone. He talks aloud to himself in front of others" (1923/1955, p. 40). Piaget reported that such speech constituted 40-70 percent of the spontaneous conversations of 5-6-year-old children, and disappeared as the child became more socially mature. By the age of 6 or 7 the child develops socialized speech and learns that it is considered inappropriate to talk outloud to oneself in the company of others. Piaget assigned no cognitive developmental functions to such speech; rather, he saw such speech as an indication of the "unsocialized" state of the child. Piaget did not consider egocentric speech to be either self-directed or self-regulatory, nor did he consider the possibility of covert self-speech.

As Piaget did not explore or attribute cognitive developmental functions to acommunicative speech, it is not necessary to discuss his position further in this paper. It is important, however, to note the controversy which his position encountered. When Vygotsky's book, Thought and Language, was published (posthumously in Russia in 1934, in English in 1962), it included a chapter severely critiquing Piaget's explanation of the development and function of egocentric speech. Piaget did not have an opportunity to respond to Vygotsky's critique until 1962, when his "Comments on Vygotsky's Critical Remarks" was distributed in pamphlet form with the 1962 edition of Vygotsky's Thought and Language. As Piaget seemed to appreciate, and others have noted since then (cf. Kohlberg, 1968; Zivin, 1979), the acommunicative speech for which both used the label "egocentric" may actually reflect two different processes, or two different sub-categories, of acommunicative speech. This is not to deny, however, that there is a real and enduring difference between the two theorists in the area of intellectual development. Piaget's theory of intellectual development is based upon the interiorization of nonverbal action, while Vygotsky maintained that the interiorization of self-speech (or egocentric speech) is central to an understanding of intellectual development. Zivin (1979, p. 28) has summarized the difference between these two:

> The place for comparison between these thinkers, indeed the place of irreconcilable difference, is on two sets of views: (1) whether the developing mind goes from an autism-like lack of awareness of the world outside the infant's own idiosyncratic experiences to an adapted or socialized structure of mind that comprehends the world in an objective (consensual) way, or whether the infant starts with socially originating and socially conditioned similar experience of the world and develops toward greater individuality that arises from using language to explore experience, meaning, and implications; (2) whether language use simply follows and mirrors intellectual structure or actively contributes to its change. The first positions in each set obviously are Piaget's...while the second positions in each set are Vygotsky's.

Zivin (1979) and Bronckart and Ventouras-Spycher (1979) present a detailed analysis of the positions held by Piaget and Vygotsky.

Vygotsky's Egocentric Speech

Vygotsky and the theorists who have followed him believed that some acommunicative speech has positive cognitive functions, rather than the basically nonfunctional characteristics of accompanying, reinforcing, or supplementing action noted by Piaget. Vygotsky presented a theory of the development of human intellect and thought in which self-speech (or, as labeled by Vygotsky, egocentric speech) played an important role. Vygotsky argued that intellectual development has two roots which eventually merge and interact (cf. Zivin, 1979). The first root is a practical, preverbal intelligence which is independent of any ability to use language and symbols. The second root is social speech. Vygotsky saw all speech, including the infant's earliest cries, gestures, and babbling, as socialized, adaptive (as an infant, for survival) communication. From birth on, the infant's communication skills are bidirectionally developed through their interactions with others.

As Zivin (1979) explains, when these two roots merge, both the nature of each and the qualitative structure of intellectual development change. The child can now think in words and can comprehend social speech. Thus self-speech is born, and begins to play its central role in intellectual development:

> As the two original roots of verbalizable thought unite, the child starts thinking in words for problem-solving and for organizing his activity. However, at first he neither realizes that his thinking should be kept to himself nor has he sufficient fluent-economical facility in verbal thinking to allow all of his thinking to be silent. Gradually, starting around age five, the child begins to master the conventional rules for and facility in silent thinking. This silent verbal thought is called 'inner speech'...It is predominantly internalized by 7 or 8, but can be re-externalized by obstacles at any age. (Zivin, 1979, p. 23)

Vygotsky did not classify all self-speech as having intellectual functions (some serve expressive or tension release functions), nor did he propose that all thought occurred in words.

Vygotsky emphasized the self-regulatory, planning function of self-speech. He saw such speech as being directed to the self, occurring either overtly or covertly, and occurring either when the child is alone or in the presence of others. To Vygotsky, "egocentric" speech does not disappear, but rather goes underground, accompanied by changes in structure and audibility.

Vygotsky focused on spontaneously produced self-speech in task or problem situations. He believed that self-speech helped the child to orient, organize, and structure behavior. He saw the child as using self-speech to consciously understand or focus on a problem or situation, and to overcome difficulties. Thus, Vygotsky postulated that self-speech would increase in task situations of increasing difficulty, and carried out a series of experiments to test this premise. He has reported finding a positive relationship between amount of self-speech and task difficulty (Vygotsky, 1962; Vygotsky & Luria, 1930). He also proposed that self-speech would increase in occurrence among young children due to increased cognitive functioning, and reported a rise in percentage of egocentric speech between the ages of 2-4 (Vygotsky, 1962, 1978).

As noted earlier, Vygotsky theorized that overt self-speech represents the transitional stage between external speech (early and initial ability to pronounce words, name objects, etc.) and internal speech. Inner speech is the third step in the four-step process of the development of pure thought. Pure thinking is the fourth step, and as Klein (1964, p. 8) notes, represents a "plan of mental functioning where words are almost no longer necessary;" or where, in Vygotsky's terms, "words die as they bring forth thought" (1962, p. 149). To support his contention that thought developed from external speech to egocentric speech and then to inner speech, Vygotsky theorized that there would be differences in both the structure and content of speech at each step. He did not see egocentric speech as a minor reflection of external speech, nor inner speech as a mirror reflection of egocentric speech. He describes egocentric speech as "speech on its way inward, intimately tied up with the ordering of the child's behavior, already partly incomprehensible to others, yet still overt in form and showing no tendency to change into whispering or any other half-soundless speech" (1962, p. 46). As the transition to inner speech begins, the child's egocentric speech becomes increasingly inaudible, condensed, and incomprehensible; this is accompanied by changes in its semantic, structural, and grammatic form. Vygotsky (1962) reports a series of brief experiments that validate these changes in the child's overt self-speech. He then theorizes about the semantical properties of inner speech (which cannot, by definition, be observed), saying that as self-speech develops:

> It shows a tendency toward an altogether specific form of abbreviation: namely, omitting the subject of a sentence and all words connected with it, while preserving the predicate. This tendency toward predication appears in all our experiments with such regularity that we must assume it to be the basic syntactic form of inner speech. (1962, p. 139)

Those interested in a further description and analysis of Vygotsky's position on egocentric speech, inner speech, and thought are referred to Wertsch (1979).

Due to Vygotsky's early death (cf. Wertsch, 1979), we do not know what further cognitive, developmental, or interventional concepts he may have developed. However, as will be seen in the following discussion, others have continued to theorize and experiment on the self-regulatory functions of overt self-speech, covert self-speech, and cognition (thoughts, images, perceptions, and beliefs).

Luria's Theory of Self-Regulatory Speech

Luria, who was Vygotsky's student, has encouraged the understanding and diffusion of Soviet theory on verbal self-regulation in the West. As explained by Harris (1979) there have been several factors which have influenced the development of Soviet theory on self-regulation. The first is the neurophysiological-psychophysiological interpretation of higher nervous activity advanced by Pavlov and his associates. The laws of conditioning and the actions and interactions of the first (direct, motoric) and second (linguistic, symbolic) signal systems in the development of human behavior influenced both Luria and Vygotsky. Further, Soviet psychology has been strongly influenced by Lenin's theories of the interactions of the two signal systems, and by Marxism. The Marxist-materialist position holds that "problems of being, of consciousness, of any mental activity are rooted and observable in physical and objective phenomena...processes of higher mental activity, in which verbalization and

self-regulation can be included, are ultimately describable in terms of the organization of matter" (Harris, 1979, p. 52). An analysis of these complex influences on Soviet theory is provided by Harris (1979). She also explains how contemporary and dynamic models such as information theory, systems analysis, and cybernetics have attempted to illustrate the process of self-regulation.

The work of Luria and Vygotsky is frequently either confused or considered to be one and the same. While Luria believed that verbal self-regulation played an important role in human development, his theory and research took a different focus and direction than that of Vygotsky. Luria explains self-regulation as an intraindividual process due to neurophysiological and/or cognitive processing, while Vygotsky originally conceived of self-regulation as an interindividual process occurring due to the internalization of others' social, interpersonal effects on the individual (cf. Zivin, 1979). While both agreed on a stage-like process culminating in inner speech or silent verbal planning, Vygotsky focused on the second signal system where words/word meanings elicit and control behavior, while Luria focused on the transition from the first to the second signal system and the physical or motor stimulation of words. Further, Vygotsky theorized about and studied naturally occurring, spontaneous speech and then made inferences to inner speech, while Luria studied only induced, experimenter directed speech in laboratory settings. Thus, Luria worked with children up to the age of 5½, while Vygotsky's theory requires studying children up to 8 years old to observe the interiorization of self-regulatory speech.

Luria studied the ability to condition, elicit, or inhibit behavior through the "impulse" or motor aspects of speech (1957, 1959, 1960, 1961a, 1961b, 1969). Luria studied the initiating and inhibiting effects of both the child's own speech and the speech of another person. To do so, he conducted several studies, including a set of bulb-pressing studies where children were instructed by the experimenter to start or stop pressing a rubber bulb, or were instructed to coordinate their presses with flashing lights and/or with their own words. Different results are reported at different ages. At 1½ to 2½ years of age, speech of another was found to initiate behavior but not to inhibit it, whereas the child's own speech neither initiated nor inhibited behavior. At 3-4 years, the speech of another both initiated and inhibited behavior, whereas the child's own speech only initiated behavior. By age 4½-5½, the child is able to initiate, inhibit, and control behavior through his/her own speech. Zivin (1979, p. 32) reports an experiment of Luria's (1961a) which illustrates that children before the age of 4½ lack the full regulating function of their own speech:

> If the 3- or 4-year-old is asked to say, 'I shall press twice,' he will verbalize correctly, but make one protracted press that lasts for the duration of his utterance; on the other hand if he says, 'Go! Go!' he will press correctly... Luria takes this last contrast as strong evidence that the control still rests in the patterns of generalized excitement in the motor effector system and has not yet been fully transferred to the semantic aspect of what the child says. By 4½ to 5½ years this task is easily passed, and control has supposedly been transferred to the full language system.

Luria and Vygotsky also differ in their interpretation of the child's motivation for self-speech. As noted earlier, Vygotsky saw young children as unable to inhibit overt expression of what they are thinking, and this talking was seen to either accidentally or concurrently affect behavior (1934/1962, 1978). Luria's explanation takes a neurophysiological viewpoint. As noted by Zivin, he sees the verbal system, in comparison to all other motor systems, as more "conditionable, discriminating, and generalizable," and as maturing more quickly. Thus, nonverbal motor behavior can be put under the control of verbal behavior. Zivin (1979, p. 32) explains this interpretation further when she states, "In Luria's view his children...are employing an external control circuit to augment the faulty internal one...the children are talking to themselves...acting (albeit unawaredly) as agents on their own behavior by speaking 'to' themselves."

Luria believed that functional and dynamic neurophysiological relationships tie the speech system to other behavioral systems (A. Harris, 1979). Further, he believed that this verbal control was progressively internalized and took increasingly abstract forms. Thus (as noted in Section I), verbal regulation has come to be defined as "the process through which some component of the language system monitors, controls, organizes, structures, or plans behavior arising in some nonverbal system in the individual...(and) is assumed to operate on motor activity, on cognitive or on perceptual processing" (A. Harris, 1979, p. 51).

Due to the ability of language to regulate (withhold, time, coordinate, or structure responses) voluntary behavior, Luria hypothesized that language could intervene in the development or maintenance of behavior in organisms that were immature, damaged, or dysfunctional (A. Harris, 1979). Luria (1932, 1967) substantiates this claim with research on children with a cerebroasthenic syndrome (similar to hyperactivity) and adults evidencing Parkinson's disease. In both cases, verbal signals were used to gradually gain some control over erratic, chaotic, and error-prone motor responses. This control over behavior, arising from components of the language system, has had a direct and significant influence on Western theories of cognitive behavior modification and cognitive training. This relationship will be explored further in the section on cognitive behavior modification.

It should be noted at this point that several attempted replications of Luria's studies (including the bulb-pressing series) have failed to repeat his results (Beiswenger, 1968; Jarvis, 1968; Miller, Shelton, & Flavell, 1970; Wilder, 1968; Wozniak, 1972). A. Harris (1979) has noted several factors which have made it difficult to assess and replicate Soviet work, including: reporting of individual protocols and raw data rather than summary statistics; problems in the presentation of statistical evidence; lack of discussion of design features; and problems of translation. She has also noted two limitations in the current theory(ies) of verbal self-regulation. The way in which speech comes to regulate or direct behavior is not yet precise nor experimentally verifiable. It is not known which features of human speech affect self-regulation in different ways and at different developmental stages. Further, while the Soviets claim that self-regulation is verbal (or arises from the language system), it is possible that the orienting, planning, and directive functions of the speech system are not unique and may be transferable to some other response system or representational system in the individual.

Reese's Mediational Deficiency Hypothesis

In 1946, Kuenne conducted a study of the effect that possession of a concept of the relation between the stimuli in a discrimination task would have on transposition. Possession of the concept did not appear to facilitate transposition for younger preschool children as much as it did for older preschool children. Kuenne (1946, p. 488) suggested that:

> There are at least two developmental stages so far as the relation of verbal responses to overt choice behavior is concerned. In the first, the child is able to make differential verbal responses to appropriate aspects of the situation, but this verbalization does not control or influence his overt choice behavior. Later, such verbalizations gain control and dominate choice behavior.

Kuenne's results were further substantiated by Alberts and Ehrenfreund (1951). The parallel between Kuenne's results and conclusions and Luria's findings on initiation and inhibition of motor acts through speech should be noted.

It was not until 1960 that the "mediation deficiency" hypothesis was proposed, in a study by Kendler, Kendler, and Wells. Their work on reversal and nonreversal shifts, discrimination tasks in which verbal labels can have an orienting function which facilitates learning, indicated age level differences in the ability to use verbalizations to improve performance (Kendler & Kendler, 1959; Kendler, Kendler, & Wells, 1960). In explaining the concept of mediational deficiency, Kendler et al. (1960, p. 87) stated, "There is a stage in human development in which verbal responses, though available, do not readily mediate between external stimuli and overt responses." The authors also noted that their conclusions were essentially the same as those reached by Luria (1957).

In 1962, Reese reviewed previous research which, while not conducted specifically under the label of "mediational deficiency," provided support for this concept. He defined the mediational deficiency hypothesis as "the suggestion that there is a stage of development in which verbal responses do not serve as mediators" (p. 502). Beginning with Kuenne's study in 1946, he reviewed studies on transposition, reversal and nonreversal shifts, discrimination set, acquired distinctiveness of cues, acquired equivalence of cues, and double alternations. Reese concluded that these studies indicated that there was a deficiency in mediation in younger children, compared with older children.

Reese made several other important points concerning the mediational deficiency hypothesis. First, he noted that "the critical age for the occurrence of mediation may be different for different experimental situations and for different concepts" (p. 507). Thus, ages at which verbalizations would facilitate performance could vary depending upon the task. Reese explained that the mediational deficiency may, in some cases, be characteristic of an early stage of human development, but that in other cases it might characterize an early stage of concept development. He noted that verbalizations may, indeed, interfere with performance when a concept is not yet well learned. (This observation is consistent with Luria's results, e.g., 1961a, where self-commands interfered with motor performance among very young children, as noted earlier.) He proposed that there is no necessary deficiency in mediation as a function of age for a well-learned concept, whereas with a less well-learned concept there is a deficiency at any age.

Reese noted that mediation might occur without explicit awareness by the individual. He noted further that whether mediation was a voluntary or an involuntary process was unknown. Instructions to use mediation, he reasoned, would be effective only if mediation is a voluntary process which individuals have not yet learned to use. Based on his reasoning presented above, even if mediation is voluntary, instructions to use verbal mediators would vary in effect, depending upon the task, the age of the individual, and the level of concept attainment.

It should be noted at this point that Reese did not relate his work to that of Luria in his review (1962). Luria is mentioned only in reference to Kendler, Kendler, and Wells' statement that their work had results similar to Luria's. Zivin (1979), however, credits this article as providing a link between American studies and Soviet theories on verbal self-regulation. Reese did not use the terms self-speech or egocentric speech, did not distinguish between overt and covert verbal mediation (in his work the covert form is assumed to exist, based on improved performance, and is assumed to be indicative of maturity, cf. Zivin, 1979), and did not differentiate between the mediational effect of spontaneous and experimentally induced verbalizations.

Flavell's Production Deficiency Hypothesis

Maccoby (1964) noted an ambiguity in the mediation deficiency hypothesis, and made the following statement: "The question is, then, whether they (young children) simply fail to use the verbal labels which are presumably available to them, or whether they do use them, but for some reason the words do not serve to mediate the response" (p. 213). Flavell, Beach, and Chinsky (1966) followed this lead in developing two hypotheses--the "mediational deficiency hypothesis" and the "production deficiency hypothesis." They originally saw these two hypotheses as opposing and mutually exclusive. The two hypotheses were defined as follows:

> 1.) Mediational deficiency: the younger child does indeed spontaneously produce the potential verbal mediators at the appropriate point in the task situation, just as the older child does, but that these verbalizations for one reason or another fail to have their expected mediational effects on his overt behavior; in brief, they occur when they ought but do not mediate as they ought.
>
> 2.) Production deficiency: the younger child tends not to produce the relevant words in the first place, and this suffices to explain the apparent nonmediated character of his overt task behavior. It is stipulated that he "knows" the relevant words and that he can and does produce them in some situations; his deficiency here consists solely in the fact that this particular task (or perhaps tasklike situations in general) fails to elicit them. (p. 284)

Flavell et al. favored the production deficiency hypothesis, and conducted experiments investigating spontaneous and induced rehearsal in immediate and delayed recall tasks (Flavell, Beach, & Chinsky, 1966; Keeney, Cannizzo, & Flavell, 1967). The results of these studies indicated that kindergarten children are less likely than older children to rehearse stimulus names in a serial recall task, that serial recall of rehearsers is significantly superior

to that of nonrehearsers, and that nonrehearsers could be trained and induced to use rehearsal which results in significantly improved performance. In both studies, however, the authors noted a need for further understanding of the nature, meaning, and mechanisms of the hypothesized production deficiency. Further, in the second study the existence of both mediational and production deficiencies is considered, as in the authors' suggestion of the plausibility that "for any child X problem dyad, the child's mediational deficiency is likely to disappear before his production deficiency does" (Keeney, Cannizzo, & Flavell, 1967, p. 965).

Conception of the inactive learner. In addition to validating the production deficiency hypothesis, these studies by Flavell and his colleagues served two other important purposes. First, the work of both Luria and Vygotsky is cited and related to their hypotheses, drawing further attention to the Soviet work among American researchers. Secondly, these studies helped to frame the "inactive learner" conception which has been applied to learning disabled students by Torgesen (1977). Flavell, Beach, and Chinsky (1966) discuss both linguistic immaturity and a general cognitive immaturity as possible explanations of production deficiency. The linguistically immature child may "have" a language, and not yet know exactly when and where to use what he has (the authors note that this is similar to the way in which an individual might have a concept or cognitive rule and yet not think to apply it on every appropriate occasion). General cognitive immaturity may be seen as a tendency to act in an intellectually passive--rather than active--fashion. The authors describe the intellectually active child as one who uses self-generated cognitive strategies, is able to sustain attention in the absence of both perceptual and social support, systematically plans for coping effectively with the task requirements, and who is goal-directed. Flavell, Beach, and Chinsky note that these characteristics may be beyond the intellectual capabilities of very young children, at least within the verbal coding and rehearsal task used in their study.

Keeney, Cannizzo, and Flavell (1967) note the possible power of the production deficiency concept in explaining not only verbal mediation deficiencies, but also any problem "involving the invocation and utilization of already-developed skills as means to some goal" (p. 965). Their study indicates that production deficiencies occur among students who have the intellectual capabilities and components required for a task. Clearly, the current conception of the "inactive learner" reflects Keeney, Cannizzo, and Flavell's (1967, p. 965) description and explanation of subjects evidencing a production deficiency:

> ...he may have virtually everything his producing age mate has, save for a hard-to-conceptualize indisposition to spontaneously invoke this 'everything' in the here and now task setting...a child can be surprisingly ripe for production, from the standpoint of having all the obvious componentry, and yet remain for some period of his childhood a stable nonproducer--perhaps even a relatively incorrigible one...for any given problem and any given S there could be a longer or shorter period in S's childhood when the component means (verbal or nonverbal) are well developed in themselves and yet tend not to get spontaneously recruited and integrated into the problem-solving sequence.

The work of Flavell and his colleagues supports several of Luria and Vygotsky's contentions: that self-guiding speech increases with age, that self-speech becomes internalized with age, and that self-speech plays a functional, positive role in task performance. However, Zivin (1979) has noted the importance of realizing that by testing the production deficiency hypothesis through memory tasks, a new function for self-speech was introduced. While Luria and Vygotsky's work had focused on ongoing, task or problem-solving situations where self-speech was considered to foster activation, goal-orientation, and self-guidance, Flavell and his colleagues extended the concept to cover strategies of memory encoding. Further, Zivin noted that the tasks used in these studies find little parallel in daily intellectual life. It should also be noted that Flavell characterized Luria as investigating the mediational deficiency hypothesis, and in a later work (Miller, Shelton, & Flavell, 1970) seriously challenged Luria's previous results.

Klein's study of spontaneous speech during problem solving. Klein, a student of Flavell's, observed 67 children, ages 3-7, left alone with an insoluble jigsaw puzzle, to test Vygotsky's theory of the structure and function of self-speech. Anything said by the subjects was recorded, as was the experimenter's narrative account of the subjects' behavior (as seen through a one-way mirror). Instances of inaudible but "mouthed" speech were also noted. Of the 67 students, 34 talked during the experimental session. Talking was not found to be related to age, school grade level, or intelligence. Whether or not the subject spoke during the puzzle task was found to be related to frequency of engaging in such speech-for-self at home (via a parent questionnaire), and to difficulty of separating from a parent when entering the experimental situation.

Subjects who had completed all of the jigsaw puzzle, with the exception of one piece which was rigged so as not to fit, were considered to have "passed" the puzzle. Approximately equal numbers of students were found to "pass" and "fail" the puzzle within the "No Talk" and "Talk" groups. No significant difference in IQ was found between those who passed and failed within the No Talk group. However, significantly higher IQ scores were found among those who passed in the Talk group as compared to those who failed. Within the Talk group, those who passed made significantly more task-relevant statements than those who failed, and task-relevant speech was found to be positively associated with age. For all subjects in the Talk group, the proportion of their total speech which was audible and comprehensible was significantly and inversely correlated with age. No significant correlation was found between the proportion of inaudible speech and age.

Klein suggested that self-speech may be a function of personality factors (such as anxiety-dependency) as well as development. Activity level was also noted as a possible determiner of self-speech, as those subjects who talked appeared more active and excitable than those who were silent. In discussing why a particular child might use self-speech, Klein suggested a "cognitive control" hypothesis. The brighter subjects in the Talk group may have been using self-speech to provide orientation, cues, and reinforcement, which were then utilized to both alleviate anxiety and to allow the child to go on and successfully work on the puzzle. Such a theory stresses the role of anxiety or some form of affective arousal in stimulating self-speech. Self-speech then allows the individual to deal with the anxiety or arousal as well as allowing the conveying and processing of information to and from the self. As Klein (1964, p. 65) concluded:

> Our suggestion is that speech-for-self appears when the individual is unable to utilize more covert, internal, and possibly more symbolic and uncommunicable forms of solution and activity. By "externalizing" in the fashion of speech-for-self, the individual may be better able to focus attention, single out individual actions, deal with interference and perhaps reach a point where he no longer needs to revert to such overt behavior.

Klein's study points to the need for further investigation of spontaneous self-speech and factors such as personality, past learning and experience, cognitive factors, social class, affective arousal, and task variables.

Kohlberg's Stage Theory of Self-Speech

Kohlberg, Yaeger, and Hjertholm (1968) reviewed the theories of language, self-speech, and thought presented by Flavell, Mead, Piaget, and Vygotsky. They then hypothesized the developmental hierarchy of private speech forms which is shown below (p. 707).

Level I. Presocial Self-Stimulating Language
1. Word play and repetition.
Level II. Outward-Directed Private Speech
2. Remarks addressed to nonhuman objects.
3. Describing own activity.
Level III. Inward-Directed or Self-Guiding Private Speech
4. Questions answered by the self.
5. Self-guiding comments.
Level IV. External Manifestations of Inner Speech
6. Inaudible muttering.
Level V. Silent Inner Speech or Thought

While this hierarchy integrates different types of acommunicative speech, it indicates a definite movement toward increasingly cognitive and inner-directed speech. While others have suggested the validity and viability of different types of acommunicative speech which may occur for different reasons in differing situations (cf. Klein, 1964; Luria, 1961; Zivin, 1979), Kohlberg et al. are the first to suggest that several different forms of acommunicative speech could be organized into a hierarchy of stages with a unitary functional significance. The authors believe that this theory and the hierarchy are justified through the theory of the development of language and thought advanced by Mead (1934).

As explained by Kohlberg et al., Mead saw thought and self-control as the internalization of the language and controlling gestures of the child's speech community. This is similar to the Soviet viewpoint, as is Mead's conception of self-speech as a transitional stage between outer speech and internal thought and self-control. In Mead's theory, however, acommunicative speech in the form of the monologue and collective monologue also serves developmental functions. Kohlberg et al. interpret Mead's viewpoint as suggesting that such forms of self-speech (i.e., the monologue) serve self-stimulating and self-orienting functions. To Mead, the child does not have an awareness of his/her own action(s) until he/she communicates about it to an "other." Thus, the child builds a concept of "self" through gestures and speech directed toward the self, allowing the self to act as the "other." Therefore, all forms of self-speech are seen as having cognitive-developmental functions.

Four separate studies were conducted and analyzed to test Kohlberg, Yeager, and Hjertholm's (1968, p. 732) theory that "various forms of private speech represent different developmental levels of behavior with a common self-communicative functional significance," and to test aspects of Piaget's theory versus Vygotsky's. In summary, the authors found that sex, nationality, and chronological age were not related to self-speech. Mental age (i.e., IQ) and task difficulty were both found to be determinants of self-speech. The authors found that bright children peak in their usage of private speech at age 4 and show a steady decline in its use thereafter. The average child, on the other hand, shows an increase in the use of self-speech between the ages of 4 to 7, and a decrease thereafter. Thus, the authors state that self-speech has a curvilinear development timed to mental age. Support for their hierarchy is found in the decrease of the lower forms of self-speech with age combined with an increasing occurrence of the higher forms. Tasks of greater difficulty were found to increase both the incidence of self-speech and the amount of speech falling into the higher steps in the hierarchy. The authors feel that their results indicate that the increase in self-speech is not due to arousal, anxiety, or frustration (based on their comparison of cognitive and sensori-motor tasks), but to an increased pull for thought or cognitive activity as task difficulty increases. The authors also found that the use of self-speech was positively correlated with popularity and the use of social speech. Self-speech was found to occur more frequently in situations involving peers rather than in those involving adults.

Kohlberg et al. state that their findings support Vygotsky's theory of egocentric speech as opposed to Piaget's. Zivin (1979), however, criticizes their study as misinterpreting, poorly presenting, and distorting the Soviet and Piagetian theories. She also criticizes the proposed hierarchy, noting a lack of justification for the developmental order and the absence of criteria for determining which acommunicative phenomena are included. However, the work of Kohlberg et al. presented a new and viable conceptualization of self-speech as well as an exploration of the factors affecting its occurrence.

Cognitive Behavior Modification and Cognitive Training

Having traced the development of theories and research in the area of self-speech/self-regulation, it is not difficult to make the link between this area and cognitive behavior modification. Originating with Vygotsky's concept that self-speech orients, organizes, and structures behavior, followed by Luria's stage-model of the development of self-regulation and its prosthetic, rehabilitative functions, Western theories and applications were born. The purpose of this section is to define and present a brief overview of cognitive behavior modification and cognitive training.

Origins of the Cognitive Approach

Cognitive behavior modification (CBM) represents a blend of behavioral and cognitive approaches for understanding and changing human behavior. Behaviorists have traditionally explained human behavior through environmental antecedents and consequences, limiting research and procedures to readily observable and measurable overt behaviors. Cognitive therapy, on the other hand, begins with the view that behavior is influenced by unobservable, and sometimes unconscious, covert operations. Thoughts, imagery, perceptions and beliefs

are stressed by the cognitive therapist. Today, many theorists and practitioners consider the division of behavioral and cognitive approaches an oversimplification. Cognitive therapists utilize behavioral techniques in changing, shaping, or reinforcing cognitions (and thus overt behaviors), while modern behaviorists and social learning theorists recognize the roles that cognitions and self-speech can play in determining and regulating an individual's behavior (cf. Mahoney & Thoresen, 1974; Martin & Pear, 1978).

Meichenbaum (1980) has discussed the origins of the cognitive behavioral approach. Along with a growing recognition of the roles which verbalizations and images play in self-control, there was a growing awareness of the lack of generalizable and durable results with available treatment programs, including behavior management and behavior modification procedures. Thus, in the late 1960's and early 1970's, researchers and practitioners from a multitude of fields and backgrounds began investigating cognitive and cognitive behavioral interventions. The manipulation of self-speech (and the cognitions to which it is tied) for educational and therapeutic purposes became a major research area. Meichenbaum (1979, p. 350), citing his ten years of research in this area, phrases the question which has shaped this area of research, "But can't we teach talking to ourselves over and above its natural amount, content, and timing initially to guide and later to train behavior that causes us (or a client) problems?" It should be noted, however, that this cognitive, self-speech approach can be found as early as 1947, when Schaffer defined therapy as "a learning process through which a person acquires an ability to speak to himself in appropriate ways so as to control his own conduct" (p. 463).

Defining Cognitive Interventions

The widespread interest in cognitive interventions has lead to a variety of methods, techniques, and labels. The terms cognitive behavior modification, cognitive training, self-instructional training, and self-control training are frequently used interchangeably, making precise definitions difficult. While Keogh and Glover (1980) have noted that different training procedures can be placed on a continuum of concrete to abstract and explicit to didactic, they have also indicated that differentiating between CBM and cognitive training may be unnecessary from a practical standpoint. Most cognitive interventions focus on systematically replacing nonfunctional, inappropriate cognitions with effective, organized, and task (or situation) relevant cognitions and behaviors. Further, cognitive training procedures generally apply operant principles (such as shaping, reinforcement, elimination of eliciting cues, extinction, and punishment) to covert behaviors, including self-speech and imagining. Specific cognitive behavioral interventions include Rational-Emotive Therapy (Ellis, 1963), Problem Solving and Social Problem Solving (Martin & Pear, 1978; Spivack, Platt, & Shure, 1974), Thought Stopping (Martin & Pear, 1978), and Meichenbaum's (1977; cf. Martin & Pear, 1978) Self-Instructional Training. Mahoney and Thoresen (1974) offer detailed discussions and descriptions of the cognitive, self-control procedures developed within social-learning theory.

Meichenbaum's Self-Instructional Procedure

Within this paper, only Meichenbaum's (1977, 1979, 1980) specific training regimen established to help children develop self-instructional control will be illustrated. This model was chosen because of its educational implications, and because it contains the components noted earlier. In this regimen a

step-by-step sequence is followed. Verbalizations are modeled by the therapist and then rehearsed by the child. This model can be used to train appropriate on-task and task approach behaviors for non-attending, hyperactive, or impulsive children (Meichenbaum & Goodman, 1971), or to teach a specific skill such as letter formation or math operations. The steps are (Meichenbaum, 1979, p. 350):

1. Cognitive Modelling - the adult model performs a task while talking aloud, the child observes.

2. Overt Guidance - the child performs the task using the same verbalizations, assisted by the adult at first, then alone.

3. Faded Self-Guidance - the child whispers the instructions while going through the task.

4. Covert Self-Instruction - the child performs the task, guided by covert self-speech.

There are four basic types of self-statements modelled by the adult and rehearsed by the child: 1) problem definition (What is it I have to do?); 2) focusing attention plus response guidance (Be careful, I have to concentrate ...draw the line down); 3) self-reinforcement (Good, I'm doing fine.); and 4) self-evaluating coping skills plus error-correcting options (That's okay... even if I make an error I can go slowly.).

Issues in Cognitive Training

While all training regimens do not follow these exact steps, CBM does have several typical components (Abikoff, 1979; Lloyd, 1980; Meichenbaum & Goodman, 1971). Students learn to control their own behavior through processes such as self-instruction, self-monitoring, self-assessment, and self-reinforcement. Verbalizations, often overt at first and later covert, are used to guide the student through a series of task-analytic steps aimed at producing effective behavior. Modelling is a common and effective method of teaching the learner to verbalize through these steps. Additionally, many CBM procedures incorporate teaching students to delay responding in order to evaluate various alternatives. While some research comparing various components has been done (cf. Keogh & Glover, 1980; Meichenbaum & Goodman, 1971; O'Leary, 1980), further study of the relative effects of singular or combined components is needed. Recent reviews of research in this area have indicated that programs using abbreviated steps or differing CBM components can significantly affect behavior (Abikoff, 1979; Finch & Spirito, 1980; Pressley, 1979).

Cognitive training and cognitive behavior modification procedures have been applied to a host of social, emotional, and academic behaviors. Target behaviors in the social and emotional areas have included: aggression, shyness, resistance to temptation, rule-breaking, social problem solving, interpersonal relations, disruptive behaviors, self-concept, and appropriate assertiveness behaviors. General or global behaviors which have been the target of academic interventions include: motivation, attitudes toward learning, organization, impulsivity, on-task behaviors, problem-solving skills, goal orientation, use of feedback, selection of strategies, metacognitive processes, perception, information processing, attack strategies, and memory. Specific motor and academic tasks, such as letter formation, math operations, and reading skills,

have also been taught with these procedures. While it is beyond the scope of this paper to review these research studies, recent reviews have been offered by Abikoff (1979), Finch and Spirito (1980), Kneedler (1980), Lloyd (1980), Loper (1980), and Pressley (1979).

Cognitive training (i.e., the training of higher order mental abilities relevant to thinking, understanding, perceiving, and learning) and cognitive behavior modification have obvious appeal. It is a treatment approach aimed directly at the individual and the cognitive processes involved (as opposed to environmental, dietary, or medicational approaches), and attempts to establish behavioral control within the individual. Thus, both generalizability and durability of effects appear promising. However, a great deal of work in this area is required before we will know exactly what interventions are most effective with what behaviors.

Cognitive training processes may interact with both task and person variables, including task length, complexity, cognitive processes required, and setting, as well as the individual's age, personality, cognitive maturity, and cognitive style (Keogh & Glover, 1980; Meichenbaum, 1980; O'Leary, 1980). The number, frequency and duration of training sessions required for effective self-regulation must also be considered. Brief, short-term interventions should not be expected to show long term, generalizable effects. The natural development of verbal regulation of behavior is a slow process keyed to developmental stages. Clinical and classroom interventions might also require considerable time and consideration of developmental variables in order to assure generalizable and durable changes in behavior. The optimal use of overt and covert verbalizations must also be considered, as talking out loud may interfere with behaviors which are timed, require reflexive reactions, or involve complex processing. Cognitive training and the development of self-control appear to be potentially effective interventions in both educational and therapeutic settings. Further work is needed to establish the parameters of treatment and their relationships to outcome variables.

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